State of Illinois
Department Of Transportation

# CONSTRUCTION INSPECTOR'S CHECKLIST FOR CONCRETE STRUCTURES OTHER THAN BRIDGE DECKS

This checklist has been prepared to provide for the field inspector a summary of easy-to-read step-by-step requirements relative to the proper construction of Concrete Structures other than Bridge Decks. The following questions are based on information found in Standard and Supplemental Specifications, Special Provisions, Plans, Highway Standards and Section 500 of the Construction Manual.

## 1. PLAN AND SPECIFICATION REVIEW

Prior to starting work on an item, have you reviewed the Contract Special Provisions and plans. ____

On bridge construction and reconstruction contracts have you checked the proposed or existing span lengths prior to starting work? (The contract may make this the Contractor's responsibility.) ____

On bridge construction and reconstruction contracts have you checked the existing or proposed vertical or horizontal clearances? ____

Prior to the start of construction, have you checked the plan elevations of the bottom of footings, intermediate substructure components and bearing seat elevations of abutments and piers to ensure they correspond to the appropriate top of deck elevations and dimensions shown on the superstructure plans? ____

Have you reviewed the appropriate Sections of the Construction Manual: Section 500 Structures, Construction Memorandum Nos. 15, 39 and 45, Documentation Section, Project Procedures Guide and Forms Section? ____

Are you computing the volume of concrete and mass (weight) of reinforcement bars for agreement with the quantity shown in the bill of materials? This will satisfy part of your documentation requirements, help familiarize you with the plans and, possibly, find plan errors. ____

## 2. PLANT & MATERIALS APPROVAL

Has the plant where the concrete is to be produced been approved? (Art. 1103.02) ____

Has the Contractor notified you of his/her proposed sources of materials prior to delivery? (Art. 106.01) ____

Has all material been inspected, tested and approved before incorporation in the work? (Art. 106.03) ____

If this contract includes the Special Provision for Quality Control/Quality Assurance (QC/QA) of Concrete Mixtures, has the district Materials office approved the Contractor's Quality Control Plan? (Special Provision) Discuss additional requirements with the district Materials office. ____

Whether QC/QA or non-QC/QA, have you reviewed all materials inspection, testing, approval, and reporting requirements for this contract? Discuss these requirements with the district Materials office. ____

## 3. EROSION AND SEDIMENT CONTROL

Prior to the start of work, has a jobsite inspection been conducted to review and designate the locations and types of erosion and sediment control protection to be placed? (Art. 280.03) ____

Prior to beginning work, have all erosion and sediment control measures been installed and approved by the Engineer? (Art. 280.03) ____

## 4. EXCAVATION FOR STRUCTURES

When the contract provides for separate payment of excavation for structures, are you taking surface elevation measurements or cross-sections of the existing ground surface prior to the start of excavation but after clearing and tree removal have been completed? (Art. 502.02, Art. 502.14, and Art. 502.15) ____

If the contract provides for cofferdams or underwater structure excavation protection, is the contractor submitting plans for approval? (Art. 502.06 and Special Provision for Underwater Structure Excavation Protection) ____

Is any pumping from the interior of a foundation enclosure done in a manner approved by the Engineer? (Art. 502.08) Make sure that no water with suspended silts, clays, or other contaminants is being pumped unfiltered directly into a waterway. (404 Permit) ____

Is the Contractor notifying you after each excavation is complete? No concrete shall be place until after the Engineer has approved the depth of the excavation and the character and condition of the foundation material. (Art. 502.09) ____

Has special care been taken not to disturb the bottom of any foundation excavation? In footings not supported by piling, the final removal of foundation material to grade shall not be made until just before the reinforcement and concrete is placed. (Art. 502.09) ____

In all footings, if the surface upon which the concrete is to be placed is soft, muddy or other unsuitable, is the material removed to an elevation directed

by the Engineer and replaced with crushed stone, gravel or other material approved by the Engineer? (Art. 502.07) ____

## 5. REINFORCEMENT BAR INSPECTION

Are all delivered rebars being stored above the ground upon skids, platforms or other supports? Are epoxy coated rebars stored on wooden or padded steel cribbing? Are the rebars protected from mechanical injury and from deterioration by exposure? For non-epoxy bars, a light coating of rust will not be considered objectionable. (Art. 508.03, Art. 1006.10(a)) ____

Do rebars conform with the plan diameter, shape and dimensions? (Art. 508.04) ____

Have you notified Materials of the rebar delivery? Have you taken any samples as instructed by Materials? ____

Are the rebars furnished from a Certified Producer? Check producer identification mark on rebar against latest approved certified producer list issued by Bureau of Materials and Physical Research. No rebars shall be used unless the producer has been certified. (Special Provision for Epoxy Coatings for Steel Reinforcement) ____

For epoxy coated rebar, has the coating been applied by a Certified Producer? Has the Contractor given the epoxy coating producer's certifications to the Resident Engineer? (BMPR Policy Memo 01-04, Special Provision for Epoxy Coatings for Steel Reinforcement) ____

For epoxy coated rebar, although rebars will be in bundles, are you making a preliminary check for damaged epoxy coating? Total damage greater than 2 percent of the bar surface in any 300 mm (1 ft.) of length of the bar or greater than 5 percent of the bar surface area covered with patching material shall be rejected. Scars greater than 5 x 5 mm (1/4 by 1/4 inch) can be repaired after placed in the deck mat. (Art. 508.05) No more than eight of the permitted holidays shall be in any 300 mm (1 ft.) length of bar. (Art. 1006.10(b)(2)) ____

## 7. FORMS

Are the forms clean, braced, tight and sufficiently rigid to prevent distortion? (Art. 503.06) ____

When wooden forms are used, are they dressed lumber or plywood, and are they oiled prior to rebar placement? When the surfaces are not exposed to view, in lieu of form oil the wood forms may be saturated with water immediately prior to placement of the concrete. (Art. 503.06) ____

Are all sharp corners in forms being filleted with 20 mm ($^3/_4$-inch) molding , or 15 mm ($^1/_2$-inch) for corners on handrails and handrail posts? (Art. 503.06) ____

Is a V-shaped groove 15 mm ($^1/_2$-inch) triangular molding being formed into the exposed face of adjacent sections of retaining walls and abutment walls? (Art. 503.09) ___

## 8. REINFORCEMENT BAR PLACEMENT

Are all reinforcement bars held securely in place? (Floating or sticking bars into wet concrete is not acceptable.) (Art. 508.05) ____

Are all bar intersections being tied? (Alternate intersection tying will be allowed when the spacing is less than one foot in each direction.) (Art. 508.05) ____

Are the reinforcement bars being rigidly supported from faces of forms and bottoms of footings by approved stays, blocks, ties, hangers or other supports? (Tips of metal bar supports must be galvanized or plastic tipped or epoxy coated. For epoxy coated rebars, the supports must be made of either epoxy coated metal or of recycled plastic.) (Art. 508.05) ____

Are all rebar splices (laps) at least the length as shown on the plans and contact spliced? (Art. 508.06) If you need to install an unplanned splice, call the Bureau of Bridges & Structures for the proper splice length. ____

Are lapping rebars not specified to be contact spliced, placed at a clear distance apart of at least 65 mm (2 1/2 inches) or contact spliced? (Art. 508.06) ____

Do all bars have the clearance from the forms as indicated on the plans? Is the clearance being maintained by the use of chairs or other supports approved by the Engineer? (Art. 508.05) ____

## 9. PREPOUR INSPECTION

Prior to the placement of the concrete have the reinforcement bars, construction joints, and forms been cleaned of loose mill scale, mortar, dirt, oil, debris, and other foreign substances? (If directed by the Engineer, temporary openings shall be provided in the bottom of forms for cleaning out all extraneous material.) (Art. 508.05, Art. 503.06, Art. 1006.10(a)) ____

Are you inspecting and approving the placement of reinforcement before concrete is placed? (Art. 508.05)

Are you ensuring that no concrete will be placed on ice, snow or frozen foundation material? (Art. 503.07) ____

Is the Contractor aware that he/she is not to place any concrete until the Engineer has approved the depth of excavation, condition of the foundation material, line and grade of forms, form dimensions, and reinforcement placement? (Art. 502.09, Art. 503.06 and Art. 508.05) ____

## 10. DRAINAGE OPENINGS

Are 75 mm (3-inch) diameter drainage openings (weep holes) at 2.4 m (8-ft.) centers, 600 mm (2 ft.) above the flowline or grade, being constructed in abutment walls, wing walls, retaining walls and culvert sidewalls unless the plans provide other means of drainage? (Art. 503.12) ____

Is a cubical deposit 600 mm x 600 mm x 600 mm (2 ft. x 2 ft. x 2 ft.) of gravel or crushed stone (Art. 1004.01) deposited behind each drainage hole with the backfilling operation? (Art. 502.10 and Art. 503.12) Is the cubical deposit completely enclosed in a fabric envelope? (Art. 502.10) ____

## 11. PLACING AND CONSOLIDATING

Are open troughs, chutes, tubes or tremies being used to place the concrete so that the concrete will drop no farther than 1.5 m (5 ft)? (Art. 503.07) ____

Is the concrete being deposited as near to its final position as possible? (Running concrete with vibrators is not permitted.) (Art. 503.07) ____

Is all structural concrete being internally consolidated with vibrators? Vibration shall be supplemented by spading for inaccessible locations. (Art. 503.07 & Section 503.07 of the Construction Manual) ____

When consolidating concrete around epoxy coated rebars, do the vibrators have non-metallic heads that were coated by the manufacturer? Slip-on covers are not allowed. (BDE Special Provision, Hand Vibrator) ____

For vertical construction, is the concrete being placed in continuous horizontal layers? Is the concrete being delivered such that there is no more than 20 minutes between successive layers? (Art. 503.08) ____

## 12. CONCRETE MIX DESIGN

Are you verifying that the proper concrete mix design is being delivered? ____

## 13. TEMPERATURE CONTROL

Are temperature checks of the plastic concrete being taken? The allowable limits for structural concrete are 10°C (50 °F) to 32°C (90 °F). When insulated forms are used, 10°C (50 °F) to 25°C (80 °F) ((Art. 1020.14(b)) ____

## 14. CONCRETE DELIVERY TICKET

Are all truck tickets being collected and retained? (Art. 1020.11(d)(8)) ____

Do concrete tickets show section number, time of batch, batch quantity, truck number, etc? (Art. 106.03, Art. 1020.11(d)(8)) ____

Are you recording on each truck ticket the inspector's initials, the results of air/slump tests, concrete temperature checks, time of discharge, water or admixtures added, drum revolutions of transit mix trucks upon arrival and strength specimens taken? ____

Are all jobsite air, slump, water or admixture additions and beam test results being submitted to the proportioning technician daily for posting on MISTIC Form MI 654, Concrete, Air, Slump Quantity, and Form MI 655, Portland Cement. Concrete Strengths? ____

## 15. REVOLUTIONS

For transit-mixed or shrink-mixed concrete, are you immediately inspecting the revolution counter (Art. 1103.01(b)) on all arriving truck mixers to ensure the required number of revolutions at mixing speed have been obtained? (Art. 1020.11) ____

Does the number fit within the allowable number of revolutions shown in the table below? ____

| Time | 60 Mixing Revs. Required (Simultaneous Charging) | | 70 Mixing Revs. Required (Separate Charging) | |
|---|---|---|---|---|
| Minutes | Minimum | Maximum | Minimum | Maximum |
| 10 | 60 | 119 | 70 | 119 |
| 15 | 66 | 144 | 72 | 144 |
| 20 | 76 | 169 | 82 | 169 |
| 25 | 86 | 194 | 92 | 194 |
| 30 | 96 | 219 | 102 | 219 |
| 35 | 106 | 244 | 112 | 244 |
| 40 | 116 | 269 | 122 | 269 |
| 45 | 126 | 294 | 132 | 294 |
| 50 | 136 | 319 | 142 | 319 |
| 55 | 146 | 344 | 152 | 344 |
| 60 | 156 | 369 | 162 | 369 |
| 65 | 166 | 394 | 172 | 394 |
| 70 | 176 | 419 | 182 | 419 |
| 75 | 186 | 444 | 192 | 444 |
| 80 | 196 | 469 | 202 | 469 |
| 85 | 206 | 494 | 212 | 494 |
| 90 | 216 | 519 | 222 | 519 |

Agitating Speed 2-5 rev/min.

Mixing Speed 5-16 rev/min.

For transit-mixed or shrink-mixed concrete, whenever water or admixtures are added to the truck at the jobsite or the revolutions on the truck are below the minimum revolutions shown on the above chart, an additional 40 revolutions at mixing speed shall be put on the truck.

No additional water may be added at the jobsite to central-mixed concrete if a reduction in the cement factor has been given for central-mixed concrete. (Art. 1020.11(d)(5))

## 16. TIME OF HAUL

Is all concrete which is being hauled in truck mixers or truck agitators being deposited within the specified haul time? (Art. 1020.11(d)) ____

| Concrete Temperature at Point of Discharge °C (°F) | | Haul Time Hours | Minutes | |
|---|---|---|---|---|
| 10-17.5 | (50-64) | 1 | 30 | |
| 18-32 | (65-90) | 1 | 0 | (without retarder) |
| 18-32 | (65-90) | 1 | 30 | (with retarder) |

No water may be added in excess of design water to maintain/increase slump. When design water has been incorporated into the mix, further increases in slump will be effected only through the use of an approved water-reducer or retarder. ____

If central-mixed concrete is being hauled in nonagitator trucks, is the concrete being deposited within 30 minutes? (Art.1020.11(d)(8)) ____

## 17. AIR CONTENT DETERMINATION

On non-QC/QA jobs, are you making an air content test on the first load each day and at least once each 40$m^3$ (50 cu.yd.) of concrete thereafter (Sampling Schedule 3, PPG) or when mix water or air entrainment admixture is added at the jobsite? ____

Note that a slump test and air test is required when a strength specimen is made.

On QC/QA jobs, the sampling and testing frequency is in accordance with the applicable Special Provision and stand-alone documents.

Allowable air content = 5% - 8% (Art. 1020.04) ____

## 18. SLUMP TEST

On non-QC/QA jobs, are you making a slump test at least once each 75 $m^3$ (100 cu. yd.); min. 1/day? (Sampling Schedule 3, PPG) ____

Note that a slump test and air test is required when a strength specimen is made.

On QC/QA jobs, the sampling and testing frequency is in accordance with the applicable Special Provision and stand-alone documents.

Allowable slump compacted by vibration (Art. 1020.04): 50-100 mm (2 – 4 inches) for Class SI Concrete. ____

## 19. STRENGTH TEST

On non-QC/QA jobs, are concrete test specimens being cast at the site of work as per one of the following requirements:

a. Modulus of Rupture (150 mm x 150 mm x 750 mm)(6 x 6 x 30 inches beam): Cast 2 beams per pour (Sampling Schedule 3, Non-QC/QA Concrete, PPG) (Art. 1020.09) ____

Are the beams being made, cured and tested in accordance with the methods given in the Manual of Test Procedures for Materials. ____

Flexural strength requirements: 4500 kPa ( 650 p.s.i.) in 14 days. (Art. 1020.04, Table 1) ____

Record beam tests in “Field Record Book of Modulus of Rupture Test of Concrete Beams” Form LW-3. ____

b. Compressive Strength 150 mm diameter x 300 mm (6 inch diameter x 12 inch cylinder): Cast 2 cylinders in lieu of each beam, i.e. 4 cylinders per pour. (Sampling Schedule 3, PPG) ____

Are the cylinders being made, cured and tested in accordance with the Manual of Test Procedures for Materials. ____

Compressive strength requirements 24,000 kPa (3500 p.s.i. in 14 days. (Art. 1020.04, Table 1) ____

Note: Submit MISTIC Form MI 655, Portland Cement Concrete Strengths to the District Materials Engineer.

On QC/QA jobs, the sampling and testing frequency is in accordance with the applicable Special Provision and stand-alone documents.

Note: If the Contractor intends to load the concrete before the completion of specified curing period, then additional beams or cylinders should be made to ensure the concrete has adequate strength.

## 20. CONSTRUCTION JOINTS

Are construction joints being made only at locations shown on the plans or approved by the Engineer, except in cases of breakdowns or other unforeseen and unavoidable delays? (Art. 503.09)

Are all construction joints bonded unless otherwise specified on the plans? (General Note on the bridge plans overriding Art. 503.09)

a. Unbonded construction joint. Is the new concrete thoroughly consolidated against the previous placed concrete? The first pour should be formed or struck to a true and even surface. (Art. 503.09(a)). ____

b. Bonded construction joint. Is the existing surface prepared by washing with water under pressure or by sandblasting to expose clean, well bonded aggregate? (Art. 503.09(b)) ____

Removal of cement paste on the first pour may be facilitated by thoroughly coating the form in contact with surface retarder, or by applying surface retarder directly to the exposed, fresh concrete surface.

When surface retarder is used, is it approved by the Engineer in advance of beginning the work? ____

Are all bonded construction joints constructed using one of the following methods, as specified in the contract or directed by the Engineer (Art. 503.09.):

(1) Coat the already placed concrete with 1:1 mortar immediately prior to placing new concrete. ____

Is any dried mortar being removed and replaced at the Contractor's expense? ____

(2) We the prepared surface of the existing concrete a minimum of one hour before application of the new concrete. ____

Is all excess water removed immediately prior to the second pour? ____

## 21. CURING

Is concrete not covered by forms being cured for 7 days but not more than 10 days by one of the following methods in accordance with Table 1020.13? ____

a. Waterproof paper method (Art. 1020.13(a)(1)) ____

b. Polyethylene sheeting method (Art. 1020.13(a)(2)) ____

c. Wetted burlap method (Art. 1020.13(a)(3)) ____

d. Membrane curing method, Type I only (Except Nov. 1 thru April 15) (Art. 1020.13 and 1020.13(a)(4)) ____

e. Wetted cotton mat method (Art. 1020.13(a)(5))

Note: In addition to the above curing methods, structure footings and foundations may be inundated with water providing the water can be maintained at 7°C (45 °F). (Art. 1020.13(d)(1))

If the Contractor is permitted to remove the forms prior to the end of the 7-day curing period, is the concrete curing continued as specified in Article 1020.13? ____

The curing period may be reduced to 3 days if high-early-strength cement is used and test beams break at not less than 4500 kPa (650 p.s.i). The test beams shall be formed, cured and protected along side and in a manner similar to the work. (Construction Memorandum No. 45) ____

## 22. PROTECTION

Is all concrete which is placed during the winter period, December 1 through March 15, being protected by one of the following methods? (1020.13) ____

a. Method I. The concrete and forms shall be completely covered with a 2-inch thick insulating material for 7 days. The insulating material shall be completely enclosed on all sides and edges with a waterproof liner. (Art. 1020.13e(1)) ____

b. Method II. The concrete shall be enclosed in adequate housing for the entire 7-day curing period. The air surrounding the concrete shall be kept between 10°C (50 °F) and 27°C (80 °F). (1020.13e(2)) Exposed concrete within the enclosure (not in forms) shall be cured in accordance with Article 1020.13(a). ____

c. Method III. For structures not specified and for incidental construction including footings and slope walls. This method may not be used when structural steel or structural concrete is in place above. (Art. 1020.13(e)) ____

If the concrete is placed outside the winter period and the temperature is forecast to be below 7°C (45 °F) the concrete shall be protected. (Art 1020.13(e)) ____

## 23. SURFACE FINISH

Are all depressions resulting from the removal of ties, rods or bolt anchorages and all air pockets or rough places larger than 15 mm (1/2-inch) diameter being carefully and neatly pointed with mortar? (Art. 503.16) ____

a. Normal Finish. Are all surfaces that will be exposed to view after completion of the work (except floors, sidewalls, curbs and medians on bridges) being given a normal finish consisting of the removal of all fins, rough spots, stains, hardened mortar or grout and form lines by rubbing with a #16 carborundum stone or equal abrasive quality? (Art. 503.16(a)) ____

Note: If the surface of concrete is oil-stained or is otherwise not of uniform color, are you requiring a grout rub as specified in Article 503.16(a)? ____

b. Rubbed Finish. Are you requiring this special finish on only those areas shown in the plans or special provisions? (Art. 503.16(b)) ____

c. Are bearing seats finished in accordance with Article 503.16 (c)? ____

## 24. WATERPROOFING

When the plans specify designated surfaces of concrete to be waterproofed, are the material options, applications rates, temperature requirements and construction procedures of Article 503.18 being met? ____

## 25. DOCUMENTATION OF FINAL CONTRACT QUANTITIES

STRUCTURE EXCAVATION – Cubic Meters (Cubic Yards)
ROCK EXCAVATION FOR STRUCTURES – Cubic Meters (Cubic Yards)

Note: Excavation for construction of slopewalls, pipe culverts, and concrete box culverts, except excavation of rock and excavation of unstable and unsuitable, will not be measured for payment.

The cost of all bailing, draining, pumping, sheeting, cribbing, disposal excess suitable material, and backfilling to the level of the existing ground surface are included in the cost of the excavation for structures, unless separate payment has been specified for any particular location.

a. When specified for payment, are before and after field measurements of the excavation recorded and on file? Are computations of the final pay quantity on file? ____

b. In lieu of measurements, do you have a jointly signed Form BC 981 agreeing to plan quantities to document the final pay quantity? ____

COFFERDAMS – Each
COFFERDAM EXCAVATION – Cubic Meters (Cubic Yards)
STRUCTURE EXCAVATION PROTECTION - Each

a. Are before and after field measurements of the cofferdam excavation recorded and on file? Are computations of the final pay quantity on file? ____

b. In lieu of measurements for cofferdam excavation, do you have a jointly signed Form BC 981 agreeing to plan quantities to document the final pay quantity? ____

CONCRETE STRUCTURES - Cubic Meters (Cubic Yards)
CONCRETE SUPERSTRUCTURE - Cubic Meters (Cubic Yards)
CONCRETE HEADWALLS - Cubic Meters (Cubic Yards)
REINFORCEMENT BARS - Kilograms (Pounds)
RUBBED FINISH – Square Meters (Square Feet)

a. Are computations based on plan dimensions in permanent file to verify plan quantities? ____

If your computations are not reasonably close to plan quantity, (within 0.2 $m^3$ (0.3 cu. yd.) for Concrete Structures and Concrete Superstructure, and 4.5 Kg (10 lbs.) for Reinforcement Bars) are your calculations being checked by another person to verify the revised quantity? ____

Are you indicating in your records that the structure was “Built to plan dimensions”? Otherwise, are you showing revised dimension? ____

Are you computing the weight of reinforcing bars using the theoretical weights as listed in Article 508.07? Or, ____

If a Design Standard was used to build the structure, have you written the statement “Built to Standard #___“ in your records? ____

b. In lieu of all the above, do you have a jointly signed Form BC 981 agreeing to plan quantities to document the final pay quantity? ____

Revised to conform with the
Standard Specifications for Road and Bridge Construction
Adopted January 1, 2002
Supplemental Specifications and Recurring Special Provisions
Adopted January 1, 2004

Also referenced are the following inserted BDE Special Provisions:
Epoxy Coatings for Steel Reinforcement
Hand Vibrator
Underwater Structure Excavation Protection
Quality Control/Quality Assurance of Concrete Mixtures
Curing and Protection of Concrete Construction